

# Flight-appropriate 3D Terrain-rendering Toolkit for Synthetic Vision, Phase II

Completed Technology Project (2005 - 2007)



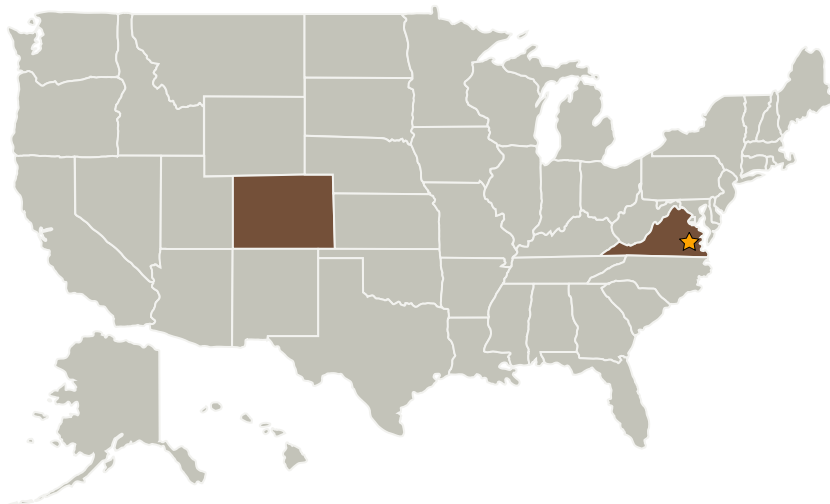
## Project Introduction

The TerraBlocks

TM

3D terrain data format and terrain-block-rendering methodology provides an enabling basis for successful commercial deployment of flight-appropriate and certifiable Synthetic Vision (SV) systems. The methodology focuses on mission-critical, real-time, embedded terrain rendering with emphasis on 1) efficient and compact terrain/texture dataset storage, 2) rendering accuracy, 3) rendering determinacy, and 4) a lightweight embedded computer and data storage platform. The innovation exploits the use of an encoded terrain data storage format coupled with real-time, terrain-block-based 3D rendering. The compact and efficient TerraBlocks encoded terrain data format inherently provides zero-error full-mesh near-field terrain data, powers-of-2 levels of detail, and data compression of full-mesh source terrain datasets. The TerraBlocks terrain block-based rendering provides deterministic render rates bounded by worst-case processing requirements, an on-the-sphere rendering model, and spatially-filtered, smoothly continuous, level-of-detail rendering. TerraBlocks technology closes the gap between existing visualization/simulation (VisSim) terrain-rendering approaches and the accuracy, performance, and platform demands of flight-deployable SV systems. The Phase I project conclusively showed the technical merit and feasibility of the TerraBlocks methodology. The Phase II project objective is to provide a flight-appropriate, research SV 3D terrain-rendering toolkit for NASA's Aviation Safety and Security Program (AvSSP) and the solid basis for Phase III, flight-certifiable SV avionics embodiments.

## Primary U.S. Work Locations and Key Partners



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## Table of Contents

|  |   |
|--|---|
| Project Introduction                         | 1 |
| Primary U.S. Work Locations and Key Partners | 1 |
| Organizational Responsibility                | 1 |
| Project Management                           | 2 |
| Technology Areas                             | 2 |

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work   | Role                    | Type        | Location            |
|---------------------------------|-------------------------|-------------|---------------------|
| ★ Langley Research Center(LaRC) | Lead Organization       | NASA Center | Hampton, Virginia   |
| TerraMetrics, Inc.              | Supporting Organization | Industry    | Littleton, Colorado |

| Primary U.S. Work Locations |          |
|-----------------------------|----------|
| Colorado                    | Virginia |

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Manager:**

Arthur B Maples

**Principal Investigator:**

Rebecca L Keiser

## Technology Areas

**Primary:**

- TX02 Flight Computing and Avionics
  - └ TX02.2 Avionics Systems and Subsystems
    - └ TX02.2.2 Aircraft Avionics Systems